



## Report on the 1<sup>st</sup> NARIT International Training Workshop (NIATW)

*by A. Richichi, coordinator*

**Goal:** NIATW was addressed to advanced students and researchers, mainly from South-East Asian countries where such training opportunities and adequate facilities are not always readily available. The focus of this first NIATW was about time-variable phenomena in Astrophysics, with emphasis on short time scales from days to sub-seconds. Examples are: stellar pulsation, oscillations, occultations, transits, exoplanets, binaries, accretion-driven variability. Also the use of archival data was promoted, e.g. to study variability in AGNs.

**Format:** A total of 25 applications were received, and 16 participants were selected (one additional person participated at his own cost for the Lunar Occultations session). See Table 1, and details in the attached file. Lectures and tutorials were held by experienced scientists of international standing from NARIT and other countries, see Table 2.

**Dates:** 25 March through 1 April 2015.

**Venue:** Chiang Mai: NARIT Headquarters, and Doi Inthanon & Base Camp.

**Budget:** About 340,000 Baht, of which about 168,000 Baht were contributed by the IAU-OAD.

**Coverage:** The following was provided to the participants free of charge:

- accommodation in Chiang Mai (except participant #17)
- allowance of 400 Baht/day while in Chiang Mai
- accommodation and meals on Doi Inthanon
- transportation
- a total of 142,000 Baht in travel grants to many participants

Additionally, return airfare was provided for Prof. Pandey and Prof. Chen. The lecturers from UK were already present at the Observatory for other reasons at no cost for travel.

**Table 1. List of participants**

| Name (Family, Given)      | Nationality | Gender | Date of Birth  | Degree Enrolled For                         | Name of University                        |
|---------------------------|-------------|--------|--|---|---|
| Artificio, Miguel         | Philippines | Male   | 19-04-1992   | MS-Astronomy                                | Rizal Technological University            |
| Harizan, Daim             | Malaysia    | Male   | 13/6/1991  | M.Sc. in astrophysics                       | Universiti Sains Malaysia                 |
| HUANG, PO-CHIEH           | Taiwan      | Male   | 19/10/1990   | Ph.D.                                       | National Central University               |
| Nguyen, Thi Hoang Anh     | Vietnam     | Female | 27/06/1980   | Dr  | Vietnam National Satellite Center         |
| Ruangsuwan, Chaiyapong    | Thailand    | Male   | 02/03/1970   | Dr  | Mahidol University                        |
| Yuan, Yuhai               | China       | Male   | 21/09/1980   | Ph.D.                                       | Guangzhou University                      |
| BHAT, SHRUTHI SURESH      | India       | Female | 01/07/1989   | Ph.D. student<br>Bachelors of<br>Technology | Christ University                         |
| Chowdhury, Sowgata        | India       | Male   | 02/11/1992   |   | Tezpur Central University                 |
| Chehlaeh, Nareemas        | Thailand    | Female | 15/01/1989   | Ph.D.                                       | Chiang Mai university                     |
| Jatmiko, Agus Triono Puri | Indonesia   | Male   | 30/08/1979   | graduated (M.Sc)                            | Institut Teknologi Bandung (ITB)          |
| JIANG, LIN QIAO           | China       | Female | 05/09/1987   | Ph.D.                                       | University of Chinese Academy of Sciences |
| LI, LIN JIA               | China       | Male   | 04/05/1984   | Ph.D.                                       | University of Chinese Academy of Sciences |
| YANN, Rem                 | Cambodia    | Male   | 17/07/1982   | M.Sc. in Physics                            | Royal University of Phnom Penh            |
| Ahmad, Nazhatulshima      | Malaysia    | Female | 07/1/1973  | PhD   | University of Malaya                      |
| Thuon, Davuth             | Cambodia    | Male   | 15/10/1990   | M. Sc.                                      | Royal University of Phnom Penh            |
| Sanguansak, Nuanwan       | Thailand    | Female | 25/12/1967   | Ph.D.                                       | University of Durham, U.K.                |
| Yue, W.C.                 | Hong Kong   | Male   | <i>Extra Participant without registration, mainly Session C (HKG Astronomical Society)</i> |   |   |

**Table 2. List of lecturers and topics**

| Lecturer        | Affiliation                         | Subject                          | Session |
|-----------------|-------------------------------------|----------------------------------|---------|
| Puji Irawati    | NARIT                               | Cat. Variables and Ecl. Binaries | A       |
| David Mkrichian | NARIT                               | Stellar Puls. & Asteroseismology | B       |
| Andrea Richichi | NARIT                               | Occultations and Transits        | C       |
| Anil Pandey     | ARIES, Nainital, India              | Fast Variability in YSO          | D       |
| Ram Kesh Yadav  | NARIT                               | IRAF Data Reduction              | D       |
| Wen Ping Chen   | National Central University, Taiwan | Variability from Sky Surveys     | E       |
| Utane Sawangwit | NARIT                               | Galaxies & Cosmology high-z      | F       |
| Vik Dhillon     | University of Sheffield (UK)        | ULTRASPEC Instrument             | -       |
| Thomas Marsh    | University of Warwick (UK)          | ULTRACAM Software                | -       |

**Program:** The program included two days of lectures in the class-room in Chiang Mai, and 5 days at the observatory site including a total of 3 nights of telescope time (4 shared nights and 1 full night). The official program is attached. It was executed almost exactly, with small variations e.g. when we had a blackout in the lecture room, and some minor exchanges among different observing slots.

The official program included:

- 21 hours of lectures (partly with tutorials for Sessions E,F).
- 15.5 hours of data reduction tutorials
- 35.5 hours of observations (including twilights). About 11 hours of observations were lost due to weather and partly replaced with additional tutorials. Data could be obtained for all Sessions, although Session D was highly penalized with only < 2 hours of observations available.

One brief excursion to the Twin Pagodas on Doi Inthanon was organized in the morning of March 29, and an additional optional brief excursion to the Royal Project was offered on the morning of March 31.

**Outcome:** the students learned to use archival data and online databases during Sessions E,F. In the other sessions, the instrumentation made available to the participants consisted of the Medium Resolution Echelle Spectrograph (MRES) and of the ULTRASPEC imaging camera. Data reduction was carried out with IRAF, with the ULTRASPEC/ULTRACAM pipeline, with the DECH spectroscopic data reduction package, and with the suite of LO software by A. Richichi (ALOR). Sessions A,B,C obtained original results which are of science grade and likely to be included in future refereed publications. The participants also learned to prepare observations and to make occultation predictions.

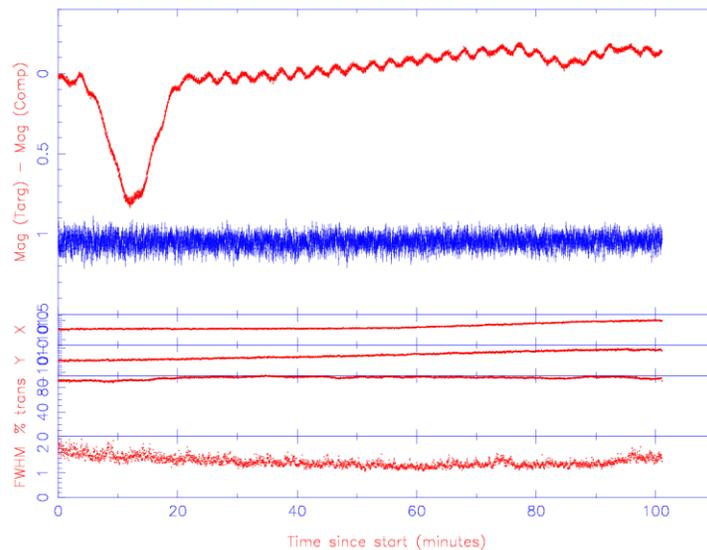


Figure 1 Light curve of an eclipsing sdB+dM binary, NY Vir, observed on 29 March using ULTRASPEC in g' filter. The sampling time is 1.95s. Top Panel: The light curve of NY Vir (red) and comparison star (blue), showing a deep primary eclipse and the secondary eclipse. The sdB star in NY Vir is pulsating with a period of  $\sim 97s$ , which can be seen clearly in the light curve of this system. The other panels cover additional parameters. (Courtesy P. Irawati)

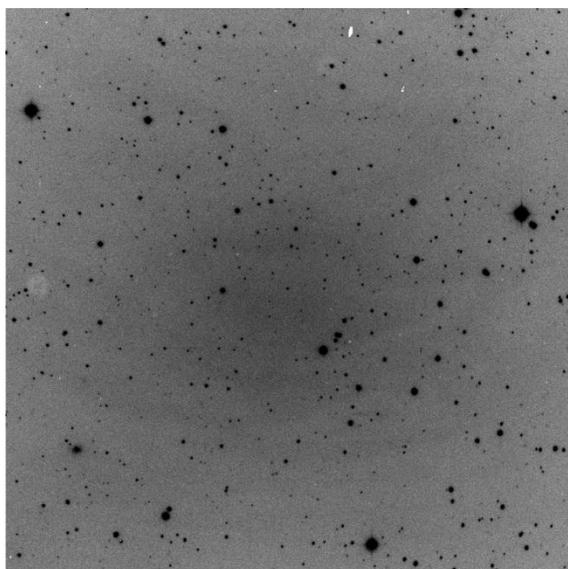


Figure 2. Image of the cluster IC 4665, observed on the night of March 27 in g' band using ULTRASPEC. (Courtesy R.K. Yadav)

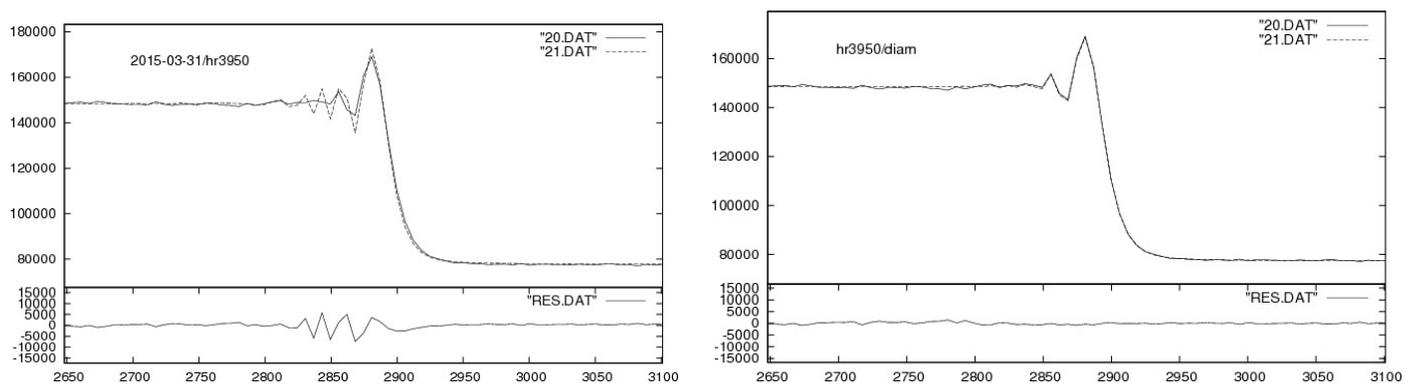


Figure 3. Left: Occultation data (20.DAT) for HR 3950 observed with ULTRASPEC on March 31, and best fit by a point source (21.DAT). The fit is clearly inadequate. Right: best fit by a model with an angular diameter of about 4.3 milliarcseconds. The time sampling was about 6 ms, the fastest available in this region of the world. X-axes are in milliseconds. (A. Richichi)

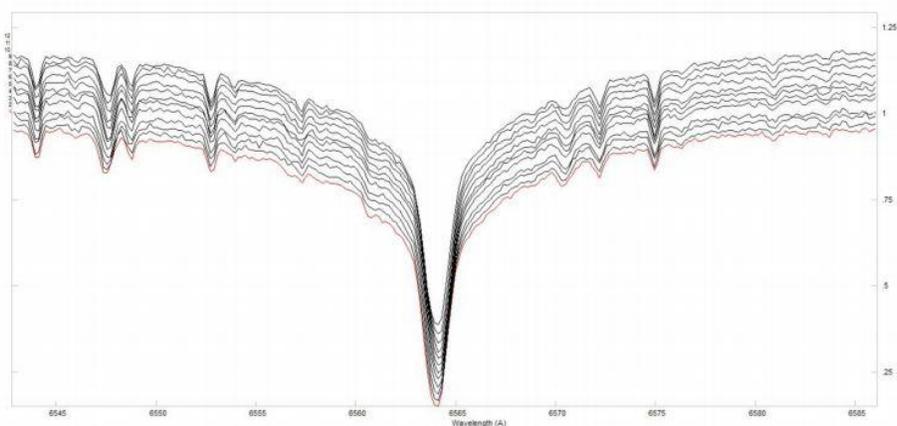


Figure 4. Time-series spectroscopy of 1 Monocerotis obtained on 30 March reduced, calibrated and normalized. This is about 1/3 of spectra obtained during that night. We can see Doppler shifts of core of H-alpha line due to pulsations. (Courtesy D. Mkrtchian)

**Benefits:** the students took a multiple choice knowledge test at the start of the workshop, and again the same was repeated in the afternoon of the last day of the workshop. The 17 questions had 4 possible choices each, and covered all sessions of the workshop, except F (no contribution from the lecturer). At the start, the average number of correct answers by participant was **5.6** (lowest 0, highest 12), slightly better than a random distribution. By the end, the average number of correct answers was **12.1** (lowest 7, highest 17), showing a marked increase in the knowledge level of the participants.

The test (including the correct answers) is attached, along with an excel summarizing the results.

**Social life:** we witnessed many interactions among the participants and with the lecturers as well, new friendships, and in general a happy mood. See B9 & B10 below. From 17 participants, 10 different nationalities were present, and this made for an enthusiastic melting pot of cultures and languages. One participant was mildly sick with stomach problems at the Observatory, but quickly recovered thanks to medicines provided by the LOC.

**Screening:** the participants also answered a pre- and a post-workshop questionnaire (see attachments) provided by IAU-OAD, aimed at establishing the level of satisfaction with various aspects of the workshop and the perceived general advantages in attending.

As an example, in the pre- questionnaire it was asked from the participants *“How confident are you that your background knowledge will be sufficient for you to understand the material covered in the workshop? (0=Not at all confident, 4=Completely confident)”*. The median of the answer to this question was 2.0, i.e. on average the participants were only partly sure of their abilities. However, the final conclusions (see B1 & B8 below) were reassuring.

In the post- questionnaire, a set of questions were asked to evaluate how the participants perceived the organization and the benefits of the workshop. We list them here, with the average score from 16 participants (question B8 was answered by 14 participants only):

( 0 Strongly disagree; 1 Disagree; 2 Neither agree nor disagree; 3 Agree; 4 Strongly agree)

B1 My background knowledge was adequate to understand all of the material: **2.9**

B2 The workshop increased my interest in Astronomy: **3.8**

B3 I intend to pursue a career in Astronomy: **3.9**

B4 The workshop covered too much material in too little time: **2.8**

B5 Lectures were clear and well-organised: **3.1**

B6 The observation sessions were well-organized: **3.6**

B7 The data reduction sessions were well-organized: **3.0**

B8 The workshop was worth my time and effort: **3.6**

B9 Other workshop participants helped me learn the material: **3.7**

B10 I intend to stay in touch with one or more of the other workshop participants: **3.8**

Participant #17, who came mainly for Session C, also answered with a mostly positive evaluation. To the question whether the participants intended to pursue a career in Astronomy, the answer was invariably **Yes**.

## **Scenes from NIATW**

On this page, we show a few random shots. A large number of photographs and videos were recorded and will be eventually made available.



The classroom in the NARIT HQ in Chiang Mai, with the participants (and some lecturers) busy on their assignments.



The classroom at the Observatory during the night, showing the participants busy with the analysis of the data they had just obtained. Note the spontaneous formation of small groups.



A well deserved moment of rest in the classroom at the Doi Inthanon base camp, during the afternoon coffee break. During the last five days, the participants were at the Observatory 12 hours almost every night, and followed additional 3-4 hours of lectures/tutorials in the afternoons. Although tired, not a single participant missed an hour.

## Lessons Learned.

The LOC was the key to success of this workshop, especially with the work of Ms Supaluck and Ms Sulisa. They took care of all paperwork relative to invitations, visas, travels, insurance, finance, refunds, accommodation in town and at the observatory site, meals including special dietary requirements, transportation. A big thanks goes also to the NARIT OPD who organized the logistics at the observatory and classrooms, and especially to Mr. Mod and Ms. Phupee for the Basecamp arrangements.

One unsatisfactory aspect was the organization of the internet access at the mountain. This was a key requirement for the workshop, and yet it gave rise to many complaints. Different access networks with complicated and mysterious access rules resulted in many disruptions. For example, in the Basecamp offices and Astro lodge some people could connect by WiFi but not by LAN on a given day, then the opposite on the next day. Some could connect with Android but not with Windows, then others had the opposite experience. Internet access is a crucial need that must be properly checked and ensured.

Two blackouts were experienced at the Basecamp. The one in the afternoon of March 31 lasted a good part of the day and, apart from the discomfort of not having facilities such as running water or internet, resulted in the cancellation of one data reduction session (this was later accommodated during the night).

The program was possibly a bit too dense (see question B4 above). In retrospect, one of the classroom sessions in Chiang Mai should have been eliminated, for example Session F – the only non-stellar subject. With 6-7 extra hours in the first two days, all of the preparatory lectures given on the mountain could have been accommodated, releasing more free/rest time in the following 5 days.

Some participants lamented that they were not properly equipped with the required software or data reduction packages on their computers. This was not a show-stopper, because the plan was that the data reduction sessions would be carried out from the personal machines of each lecturer. Also, there was a wide range of platforms among the participants, e.g., Windows or Mac or Linux, with a laptop or a tablet, etc. For example, data reduction for sessions A & D could only be executed under Linux, while for sessions B & C only under Windows. All data reduction sessions could take place as planned, however for a future event it might be useful to plan in advance either for specific instructions given to the participants before their arrival, or to provide workstations (this last option was considered for NIATW but found impossible to implement).

The number of participants was restricted to 15 (later extended to 16/17), and this was a key factor for the efficiency of the interactions especially during observations. A larger number would have been very difficult to manage in the Control Room of the telescope, and would not have ensured a proper experience with the instruments for all participants.

Preferably, knowledge and evaluation forms should be made available online. However, for this first NIATW they were finalized only few days before the start and time was not enough. For the future, this would be a strong requirement.

